AD-A047 716 NAVAL DENTAL RESEARCH INST GREAT LAKES ILL F/G 6/5
SUMMARIES OF RESEARCH, FISCAL YEAR 1977,(U)
OCT 77
UNCLASSIFIED NDRI-PR-77-07 NL

| OF |
AD
A047716

END
DATE
FILMED
1 -78
DDC

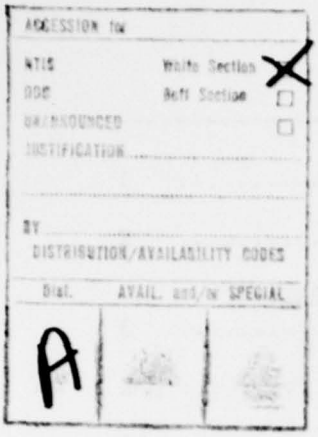
NDRI-PR 77-07
October 1977

SUMMARIES OF RESEARCH

Fiscal Year 1977

NAVAL
DENTAL RESEARCH
INSTITUTE

Naval Medical Research and Development Command
Bethesda, Maryland



NAVAL DENTAL RESEARCH INSTITUTE
NAVAL BASE, BLDG. 1-H
GREAT LAKES, ILLINOIS 60088

SUMMARIES OF RESEARCH

Fiscal Year 1977

These summaries cover research carried out from 01 October 1976 through 30 September 1977.

This document has been approved for public release; its distribution is unlimited.

Submitted by:

R. J. Lindsay

R. J. LINDSAY
LT MSC USN
Administrative Officer

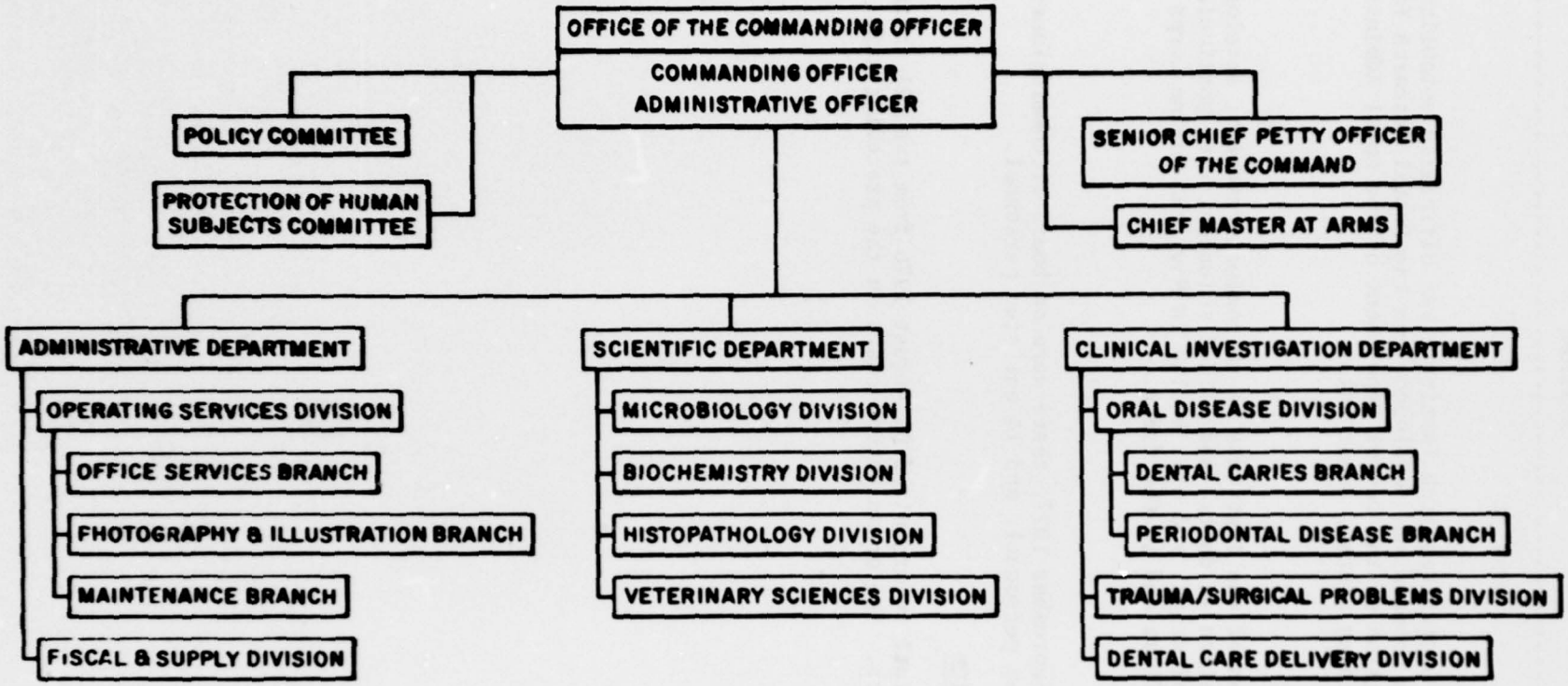
Approved by:

M. R. Wirthlin Jr.

M. R. WIRTHLIN, JR.
CAPT DC USN
Commanding Officer

TABLE OF CONTENTS

NAVAL DENTAL RESEARCH INSTITUTE



DATE: 27 Oct 1977 APPROVED: Milton R. Wirthlin

MILTON R. WIRTHLIN JR., CAPTAIN, DC, USN

TITLE OF PARENT ORGANIZATION: NMRDC

TITLE OF FIELD ACTIVITY: NAVAL DENTAL RESEARCH INSTITUTE

MISSION

COMMAND

The Naval Dental Research Institute was officially established 01 January 1967. The command was developed from the Dental Research Facility, which was a Division of the Dental Department of the Naval Administrative Command, Naval Training Center, Great Lakes.

MISSION

The mission of the Institute is to conduct research, development, test and evaluation in dental and allied sciences, with particular emphasis on problems of dental and oral health in Navy and Marine Corps populations ashore, afloat and in the field.

PERSONNEL

As of 30 September 1977, there were on board 11 commissioned officers, 12 civilian personnel, and 14 enlisted personnel.

ORGANIZATION

The Institute re-organized 05 August 1976 from two (2) to three (3) Departments. See organization chart on the preceding page.

FORMAL PRESENTATIONS OF RESEARCH MADE AT MEETINGS OF SCIENTIFIC SOCIETIES
RESULTS REPORTED AND/OR DISCUSSIONS LED

OCTOBER

The Dental Wives Club toured the Institute. Presentations were given by Captain Wirthlin, Captain Anderson, Dr. Shklair and Major Gaines.

NOVEMBER

HANCOCK, E. B. presented "Plaque Formation and Development" to a Periodontology Seminar at the Naval Regional Dental Center, Great Lakes.

SIMONSON, L. G. presented "Therapeutic Approaches to Dental Caries and Periodontoal Disease" to North Suburban Dental Hygienists Society.

WALTER, R. W. presented "The Epidemiology of Streptococcus mutans in Caries-Free and Caries-Active Naval Recruits" to a meeting of the Chicago Section, American Association for Dental Research.

YEAGER, J. E. presented "Tooth Replacement Systems: Transplants and Implants," to the Chicago Section of the American Association for Dental Research.

DECEMBER

GAINES, J. F. presented "The Comparative Aspects of Osteopetrosis" to American College of Veterinary Pathologists at a meeting in Miami, Florida.

MARCH

WALTER, R. W. presented "Microbiology and Periodontal Diseases" to Periodontology Seminar Group, Naval Regional Dental Center, Great Lakes, Illinois.

WIRTHLIN, M. R. presented "Dental Research Program at NDRI" to a seminar at the Naval Regional Dental Center, Great Lakes, Illinois.

APRIL

YEAGER, J. E. presented "Dental Implants and Transplants" to the Oral Surgery Department, University of Illinois, Chicago.

FORMAL PRESENTATIONS OF RESEARCH MADE AT MEETINGS OF SCIENTIFIC SOCIETIES
RESULTS REPORTED AND/OR DISCUSSIONS LED (Continued)

JUNE

American Association for Dental Research Meeting, held at Las Vegas, Nevada, was attended by:

ANDERSON, D. M. presented "Evaluation of Dental Pulp Irritants with a Rabbit Intradermal Test."

CLARK, G. E. presented "Inorganic Pyrophosphatase of Streptococcus mutans: Purification and Characterizations of Activity."

DEVINE, L. F. presented "An Improved Selective Medium for the Isolation of Streptococcus mutans."

GALICH, J. W. presented "Enzyme Histochemistry of Osteopetrotic Bone Development in the tl Mutant."

LAMBERTS, B. L. presented "Some Characteristics of Dextranase-Degradation Products of Water-Insoluble Streptococcal Glucans."

LEONARD, E. P. presented "Sequential Pathogenesis of Periodontal Destruction in the Rice Rat," and assisted in poster presentation of "Enzyme Histochemistry of Osteopetrotic Bone Development in the tl Mutant."

SHKLAIR, I. L. presented "Effect of Sodium Fluoride on Extracellular Glucan Production of Streptococcus mutans."

SIMONSON, L. G. presented "Biochemical Modification of Dextranase to Improve its Oral Therapeutic Properties."

WIRTHLIN, M. R. presented "Rupture Strength of Healing Gingival Wounds in Miniature Swine."

YEAGER, J. E. presented "A Thirty-Nine Week Functional Evaluation of Four Dental Implant Materials."

SEPTEMBER

GAINES, J. F. presented "Acute Fatal Gastric Dilation in a Rhesus Monkey" to the annual interbranch meeting of the Chicago and Milwaukee branches of the American Association for Laboratory Animal Science held at Lake Geneva, Wisconsin.

PARTICIPATION IN OTHER PROGRAMS

OCTOBER

ANDERSON, D. M. attended E. D. Coolidge Endodontic Society Meeting, Chicago.

CLARK, G. E. attended Odontographic Society Meeting, Chicago.

GAUGLER, R. W. attended Chicago Section Meeting of the American Association for Dental Research.

HANCOCK, E. B. attended Odontographic Society Meeting, Chicago; Great Lakes Dental Society; University of Michigan Symposium, "The Scientific Basis for Evaluation of Periodontal Therapy."

LAMBERTS, B. L. consulted with Dr. Jeanes at Northern Regional Research Laboratory, Peoria, and attended Chicago Section of the American Association for Dental Research.

SHKLAIR, I. L. attended Supervisors Meeting at Great Lakes on "Drugs and Alcoholism."

WIRTHLIN, M. R. attended University of Michigan Symposium, "The Scientific Basis for Periodontal Therapy," and attended the Annual Federal Women's Luncheon.

The Navy Birthday was celebrated by a Command Inspection, a movie for all hands and a visit by Captain Zenni of NTC, Great Lakes.

NOVEMBER

A meeting of the Chicago Chapter of the American Association for Dental Research was attended by the following staff personnel:

ANDERSON, D. M.
CLARK, G. E.
GAUGLER, R. W.
HANCOCK, E. B.
LAMBERTS, B. L.
LEONARD, E. P.
SIMONSON, L. G.
WALTER, R. G.
WIRTHLIN, M. R.
YEAGER, J. E.
SHKLAIR, I. L.

GAINES, J. F. attended the annual convention of the American Association for Laboratory Animal Science.

PARTICIPATION IN OTHER PROGRAMS (Continued)

NOVEMBER (Cont.)

HANCOCK, E. B. attended annual meeting of the American Academy of Periodontology, San Francisco.

HORTON, A. J. attended annual meeting of the American Association for Laboratory Animal Science.

WIRTHLIN, M. R. attended annual meeting of the American Academy of Periodontology, San Francisco.

DECEMBER

The Great Lakes Dental Society Meeting was attended by:

GALICH, J. W.
HANCOCK, E. B.
WIRTHLIN, M. R.
YEAGER, J. E.

HANCOCK, E. B. evaluated graduate research proposals at Indiana University, Department of Periodontics, Indianapolis, Indiana.

JANUARY

ANDERSON, D. M. attended meeting of the Great Lakes Dental Society; meeting of Chicago Chapter of the American Association for Dental Research, and Sigma Xi meeting at Abbott Laboratories, North Chicago, Illinois. Also attended meeting of the Program Committee of the American Association for Dental Research as Pulp Biology Chapter representative.

CLARK, G. E. attended meeting of the Great Lakes Dental Society where "Occlusion and Periodontal Disease - One Man's Opinion" was presented. Also attended Chicago Chapter of the American Association for Dental Research.

GAUGLER, R. W. attended Sigma Xi meeting at Abbott Laboratories, North Chicago, Illinois.

LAMBERTS, B. L. attended Chicago Chapter of the American Association for Dental Research.

SHKLAIR, I. L. attended meeting of the Program Committee for the American Association for Dental Research where the program was finalized.

WIRTHLIN, M. R. attended Great Lakes Dental Society Meeting and Chicago Chapter of the American Association for Dental Research.

YEAGER, J. E. attended Great Lakes Dental Society meeting.

PARTICIPATION IN OTHER PROGRAMS (Continued)

FEBRUARY

ANDERSON, D. M. attended Naval Reserve Lucheon, Midwinter Meeting, Chicago.

CLARK, G. E. attended Casualty Care class at the Naval Regional Dental Center, Great Lakes, Illinois.

HANCOCK, E. B. attended Midwest Society of Periodontology annual meeting, Chicago, and Casualty Care class at the Naval Regional Dental Center, Great Lakes, Illinois.

WIRTHLIN, M. R. attended Midwest Society of Periodontology and Chicago Dental Society Midwinter Meeting.

MARCH

A meeting of the Great Lakes Dental Society was attended by the following personnel:

ANDERSON, D. M.
CLARK, G. E.
GALICH, J. W.
HANCOCK, E. B.
LEONARD, E. P.
WIRTHLIN, M. R.
YEAGER, J. E.

LAMBERTS, B. L. attended Supervisors Training on Performance Evaluation, Consolidated Civilian Personnel Office at Great Lakes, Illinois.

SHKLAIR, I. L. attended Supervisors Training on Performance Evaluation, Consolidated Civilian Personnel Office at Great Lakes, Illinois.

YEAGER, J. E. attended University of Illinois Oral Surgery Seminar.

All NDRI investigators attended a seminar presented by Dr. J. S. Hanker of the University of North Carolina.

APRIL

A meeting of the Chicago Section of the American Association for Dental Research was attended by the following personnel:

CLARK, G. E.
GAUGLER, R. W.
LAMBERTS, B. L.
SHKLAIR, I. L.

ANDERSON, D. M. attended the annual meeting of the American Association of Endodontists, Houston, Texas.

PARTICIPATION IN OTHER PROGRAMS (Continued)

APRIL (Cont.)

LAMBERTS, B. L. was elected Secretary of the Chicago Section of the American Association for Dental Research for 1977-1978.

SIMONSON, L. G. was selected as co-chairman of the Microbiology Session II of the American Association for Dental Research meeting to be held in Las Vegas, Nevada.

HANCOCK, E. B. did an evaluation and critique of graduate research in periodontology, Indiana University, Indianapolis, Indiana.

MAY

Naval Dental Research Institute hosted a meeting of the Chicago Section, American Association for Dental Research, which was attended by the following staff personnel:

ANDERSON, D. M.
CLARK, G. E.
GALICH, J. W.
HANCOCK, E. B.
LAMBERTS, B. L.
LEONARD, E. P.
SHKLAIR, I. L.
SIMONSON, L. G.
WIRTHLIN, M. R.
YEAGER, J. E.

A meeting of the Great Lakes Dental Society was attended by:

GALICH, J. W.
HANCOCK, E. B.
LEONARD, E. P.
WIRTHLIN, M. R.

WIRTHLIN, M. R. attended a luncheon/program with Mayor Bilandic of Chicago for Armed Forces Day; and the Illinois Dental Society meeting.

JUNE

The annual meeting of the American Association for Dental Research, held in Las Vegas, Nevada, was attended by:

ANDERSON, D. M.
CLARK, G. E.
DEVINE, L. F.
GALICH, J. W.
GAUGLER, R. W.
HANCOCK, E. B.
LAMBERTS, B. L.
LEONARD, E. P.
MANDEL, E.
SHKLAIR, I. L.
SIMONSON, L. G.
WIRTHLIN, M. R.
YEAGER, J. E.

PARTICIPATION ON OTHER PROGRAMS (Continued)

JUNE (Cont.)

ANDERSON, D. M. was co-chairman of Session H, Pulp Biology II - Physiology, Immunology, Pathology - at the annual session of the American Association for Dental Research, Las Vegas, Nevada.

LEONARD, E. P. was co-chairman of Session F, Periodontology V - Healing-Experimental Surgery, at the annual session of the American Association for Dental Research, Las Vegas, Nevada.

SIMONSON, L. G. was co-chairman, Microbiology, Session A at the annual session of the American Association for Dental Research. Visited ADA Research Institute, Electron Optics Laboratory, Chicago, Illinois.

WIRTHLIN, M. R. attended International Conference on Research in the Biology of Periodontal Disease.

JULY

LAMBERTS, B. L. attended a program planning meeting of the officers of the Chicago Secion, American Association for Dental Research.

AUGUST

GAINES, J. F. attended a short course on "Pathology of Laboratory Animals" at Armed Forces Institute of Pathology, Washington, D. C.

WIRTHLIN, M. R. attended the Change of Command ceremony for RADM T. W. McNamara, new Commandant of the Ninth Naval District.

SEPTEMBER

A meeting of the Great Lakes Dental Society, where Dr. Gene Messer presented "The Training of an Oral Surgery Resident" was attended by the following staff personnel:

ANDERSON, D. M.
CLARK, G. E.
HANCOCK, E. B.
LEONARD, E. P.
WIRTHLIN, M. R.
YEAGER, J. E.

YEAGER, J. E. attended the annual meeting of the American Society of Oral Surgeons, held in San Francisco, California.

WORK UNITS - FISCAL YEAR 1978

63706N M0095-PN M0095-PN003 3008 - Evaluation of Expedient Procedures for Treating Dental Pulp Disease in Naval Personnel

63706N M0095-PN M0095-PN003 3010 - Wound Healing of the Supporting Tissues of the Teeth of Naval Personnel

63706N M0095-PN M0095-PN003 3011 - Evaluation of Dental Implants as Applied to Navy and Marine Corps Personnel

M0095 PN003 3016 - Navy Dental Technician Utilization

61153N MR04120 MR0412002 0408 - Evaluation of Therapeutic Agents for the Prevention of Oral Bone Destruction in Navy and Marine Corps Personnel

61153N MR04120 MR0412002 6049 - Microbiology of Oral Diseases of Significanace to Naval Personnel

62758N F51524 ZF51524012 0002 - Evaluation of Antimicrobial Agents on Disease Producing Organisms of the Oral Cavity of Naval Recruits

62758N F51524 ZF51524012 0006 - Evaluation of Navy Oral Health Programs

62758N F51524 ZF51524012 0012 - Evaluation of Methods to Degrade Components of Dental Plaque Associated with Oral Disease of Naval Personnel

62758N F51524 ZF51524012 0022 - Evaluation of Oral Factors in Decay-Free Naval Recruits to Develop New Preventive Measures

RESEARCH PROGRESS REPORTS - FY 1977

NDRI PR 76-08 Summaries of Research
01 January - 30 September 1976

NDRI PR 76-09 Prevalence of Caries Free Naval Recruits from Cities with Fluoridated and Non-Fluoridated Water Supplies
H. J. Keene, I. L. Shklair and K. C. Hoerman
(J. Dent. Res. 55:704, 1976)

NDRI PR 76-10 Research Abstracts of 1976

NDRI PR 76-11 Parathyroid Hormone as a Possible Causal Factor in Osteopetrosis of the tl Rat
W. R. Cotton, G. A. Williams, G. K. Hargis and J. F. Gaines
(Endocrinology 99:872-874, 1976)

NDRI PR 76-12 Latex Spheres as Immunologic Markers to Demonstrate the Binding of Human Salivary Immunoglobulins to Streptococcus mutans
G. R. Riviere, W. R. Cotton and J. F. Derkowski
(J. Dent. Res. 55:879-885, 1976)

NDRI PR 76-13 Enamel Solubility Rate Measurements In Vivo on Naval Recruits
B. L. Lamberts, H. J. Keene and S. Levin
(J. Dent. Res. 55:797-804, 1976)

NDRI PR 77-01 Three Recessive Genes for Congential Osteopetrosis in the Norway Rat
R. Moutier, K. Toyama, W. R. Cotton and J. F. Gaines
(J. Heredity 67:189-190, 1976)

NDRI PR 77-02 Cell-Mediated Lymphocytotoxic Response to Orthotopic Tooth Allografts by RhL-A-Matched Rhesus Monkeys
G. R. Riviere, J. E. Yeager and J. L. Derkowski
(Transplantation 23:176-179, 1977)

NDRI PR 77-03 Gingivitis, Bacterial Plaque and Streptococcus mutans in Naval Recruits from Saudi Arabia
M. R. Wirthlin, H. J. Keene and I. L. Shklair
(J. Periodontol. 48:209-211, 1977)

NDRI PR 77-04 Relationship of Streptococcus mutans Biotypes to Dental Caries Experience in Saudi Arabian Naval Men
H. J. Keene, I. L. Shklair, D. M. Anderson and G. J. Mickel
(J. Dent. Res. 56:356-361, 1977)

RESEARCH PROGRESS REPORTS - FY 1977 (Continued)

NDRI PR 77-05 Distribution of *Streptococcus mutans* Biotypes in Five Human Populations
H. J. Keene, I. L. Shklair, G. J. Mickel and M. R. Wirthlin
(J. Dent. Res. 56:5-10, 1977)

NDRI PR 77-06 Effect of Multiple Dental Floss-SnF_2 Treatment on *Streptococcus mutans* in Interproximal Plaque
H. J. Keene, I. L. Shklair and G. J. Mickel
(J. Dent. Res. 56:21-27, 1977)

OTHER PUBLICATIONS

CLARK, G. E. and FRATTALI, V., "Appearance of Inorganic Pyrophosphatase During Growth of Streptococcus mutans Cells," Proc. Soc. Exp. Biol. Med. 153:468-472, December, 1976.

HANCOCK, E. B. and WIRTHLIN, M. R., "An Evaluation of the Navy Periodontal Screening Examination," J. Periodontol. 48:63-66, 1977.

KEENE, H. J., SHKLAIR, I. L. and MICKEL, G. J., "Effects of Multiple Dental Floss-SnF_2 Treatment on Streptococcus mutans in Interproximal Plaque," J. Dent. Res. 56:21-23, 1977.

KEENE, H. J., SHKLAIR, I. L., MICKEL, G. J. and WIRTHLIN, M. R., "Distribution of Streptococcus mutans in Five Human Populations," J. Dent. Res. 56:5-10, 1977.

LAMBERTS, B. L., KEENE, H. J. and SHKLAIR, I. L., "Enamel Solubility Rate Measurements In Vivo on Naval Recruits," J. Dent. Res. 55:797-804, September-October, 1976.

LEONARD, E. P., "Histochemical Comparison of the Developing Palatal Bone in Osteopetrotic tl Rats and their Normal Littermates," Arch. Oral Biol. 211:775-778, 1976.

RIVIERE, G. R., YEAGER, J. E., DERKOWSKI, J. L. and NEEFE, J. R., Jr., "Cell-Mediated Lymphocytotoxic Response to Orthotopic Tooth Allografts by RhL-A-Matched Rhesus Monkeys," Transplantation 23:176-179, 1977.

SHKLAIR, I. L., "Biochemical Study of the Relationship of Extracellular Glucan to Adherence and Cariogenicity in S. mutans and an Extracellular Polysaccharide Mutant," J. Bact. 129:351, 1977.

SHKLAIR, I. L., "Biochemical Characterization and Distribution of S. mutans in Three Diverse Populations," in "Microbial Aspects of Dental Care," editors Stily, Loesche and O'Brien, special suppl. microbiology, abstracts Vol. 1, 201, 1976.

WIRTHLIN, M. R., "Gingivitis, Bacterial Plaque and Streptococcus mutans in Naval Recruits from Saudi Arabia," J. Periodontol. 48: 209-211, 1977.

DISTINGUISHED VISITORS

OCTOBER

L. M. Armstrong, Captain, DC, USN (Retired)
Dr. G. R. Riviere, UCLA Dental School, Los Angeles, California
Dr. Kent Sorrells, Quaker Oats Company, Barrington, Illinois
Captain M. M. Zenni, Commander Naval Training Center, Great Lakes, IL
Dental Wives Club for a tour and briefing

NOVEMBER

John R. Hinds, General Electric, Medical, Milwaukee, Wisconsin

DECEMBER

Dr. Kaare Langeland, University of Connecticut, Farmington, Connecticut
Dr. Sandy C. Marks, Jr., University of Massachusetts Medical School, Worchester, Massachusetts
LtCol Wm. R. Pryor, Veterinary Consultant to the Command Veterinarian for Research Activities, Naval Medical Research Institute, Animal Facility, Bethesda, Maryland
Frank Spitz of LKB

JANUARY

Mr. Dan Liu, PRI, Huntsville, Alabama
Malcolm McDonald, GSA, Chicago, Illinois
Anthony McDonald, GSA, Chicago, Illinois
C. E. Wollitz, Stuart, Wilmington, Delaware
J. P. Wheeler, Stuart, Wilmington, Delaware

FEBRUARY

Captain H. J. Keene, DC, USN, Head, Dental Health Division, Naval Medical Research and Development Command, Bethesda, Maryland

MARCH

Dr. James C. Cecil, University of Michigan, Ann Arbor, Michigan
Dr. L. I. Goldblatt, Indiana University School of Dentistry, Indianapolis, Indiana
Dr. J. S. Hanker, University of North Carolina, Chapel Hill, North Carolina
Dr. Keith Moore, Division of Biophysics, ADA Research Institutes, Chicago, Illinois

APRIL

Captain Wm. R. Cotton, DC, USN, Naval Medical Research Institute, Bethesda, Maryland
Dr. George R. Riviere, UCLA Dental School, Los Angeles, California

DISTINGUISHED VISITORS (Continued)

APRIL (Cont.)

Dr. C. Sanders, Economics Branch, American Dental Association, Chicago, Illinois
Dean Seymore Yale, Dental School of Illinois
Dr. J. Thorpe, University of Illinois Dental School
Dr. B. Klavan, Head, Department of Periodontics, University of Illinois Dental School

MAY

C. Bysura, Northern Navy Facilities, Philadelphia, Pennsylvania
W. E. Carrigan, Office of Civilian Personnel, N. Fiebl. Division, Philadelphia, Pennsylvania
Dr. and Mrs. M. Kritchevsky, National Institutes of Health, Bethesda, Maryland
George Montaygne, ONR Patent Counsel

JULY

Ms. Barbara Cook, American Red Cross
David Alckit, University of Denver, Dental School, Denver, Colorado
David Olinzock, University of Denver, Dental School, Denver, Colorado
George Montaygne, ONR Patent Counsel
Dr. G. Tarquino, University of Indiana Dental School, Indianapolis, Indiana
Miles T. Wilhelm, Washington University, St. Louis, Missouri
Dental Clerk tour was led by LT J. W. Galich

AUGUST

DT1 Stephen W. Bockowski, National Naval Dental Center, Bethesda, Maryland
Malcolm McDonald, GSA, Chicago, Illinois
Anthony McDonald, GSA, Chicago, Illinois
J. Vauk of Digital Equipment Corp

SEPTEMBER

VADM W. P. Arentzen, USN, Chief, BUMED, Surgeon General of the Navy
Ms. Louise Diver, Field Representative, Headquarters, Navy Relief, Washington, D. C.
Captain Colvin, Commander, Naval Training Center, Great Lakes
Captain Reynold J. Fishback, DC, USNR, Commanding Officer, Naval Reserve Company 9-17
RADM T. W. McNamara, Commandant, Ninth Naval District

STATEMENT OF SIGNIFICANT ACCOMPLISHMENTS

CLINICAL INVESTIGATION DEPARTMENT

(Oral Diseases Division)

A standard pedicle flap gingival wound was evaluated at 0, 2, 7 and 14 days healing stages in six miniature swine. At each time the wounds were tested for rupture strength and samples were removed for collagen analysis. Other specimens were evaluated by histometrics and histology. There did not appear to be any difference in the percent of collagen found with healing time. The proportion of collagen found in salt and weak acid extracts was low and differences were smaller than the experimental error of the method. The reepithelization of the dentogingival junction was nearly complete at seven days and indistinguishable from unwounded tissue at 14 days. The relationship of epithelization to rupture strength had a positive correlation ($r = +0.624$, $p = < 0.01$). It appears that the initial attachment of the flap is through regeneration of the junctional epithelium. This work continues in monkeys.

Examination and interview with extensive clinical and epidemiological data recording was completed on 15 persons with necrotizing gingivitis (ANUG, Vincent's gingivitis, trench mouth). Loss of the interdental papilla by necrosis, acute onset and severe pain and bleeding were characteristics of this illness. Pre-exisitng bacterial plaque and chronic marginal gingivitis were determined to be part of the etiologic pattern, but there were no unusual levels of dental indices (DMFT, NPDI, NPI, CSI). The local factors of rough or overhanging restorations, sharp edges, open contacts and food impactions were very few in this group. There were no medical problems, unusual vital signs or uncommon clinical laboratory findings. However, all subjects had general symptoms of malaise, upper respiratory and some gastrointestinal complaints. Subjects generally denied that they perceived stress with dental visits, their living conditions, diet, duties or interpersonal relationships. No severe nutritional deficiencies could be found on diet review. Half the subjects had normal Zung SDS scores for depression and half were slightly elevated. The only common thread in their general background was sexual promiscuity. All but one subject admitted to oro-genital contact, usually one to three weeks before acute onset. It could be postulated that necrotizing gingivitis is an infection transmitted venereally. The local and general symptoms may be part of a syndrome associated with a unique microorganism. Using pre-reduced media and anaerobic culture conditions, we were unsuccessful in isolating spirochetes. We did not find Neisseria gonorrhea in any subject's gingival lesions. Evidence to support a venereal hypothesis requires further work to isolate a specific causative organism.

The study to evaluate conservative therapy for deeply carious teeth with diseased, but viable, pulps is divided into three phases. In the first, or diagnostic phase, clinical data from signs, symptoms, tests and history is correlated with the health and repair potential of the dental pulp as determined histologically. In phase two, a tentative clinical diagnosis of pulp condition is made for teeth having "U" lesions; i. e.,

CLINICAL INVESTIGATION DEPARTMENT (Cont.)

caries extending through three-fourths the dentin thickness, but short of clinical or radiographic exposure. Without influencing decisions, the examiners monitor the treatment given each tooth by recording the methods, materials, and time expended at recruit and service school dental clinics. The collected data is coded for computer processing and analysis after two-year recall examinations. During phase three, deeply carious teeth will be selected for conservative pulp treatment according to definite guidelines established from evaluation of the earlier phases.

During FY77, 590 recruit patients were screened. Of these, 136 men had 250 deeply carious teeth for which comprehensive clinical data was recorded. After radiographic evaluation, 134 of the teeth (86 men) were determined to have "U" lesions and the remaining 116 had either apparent pulp exposures or had dentin caries of insufficient depth. Treatment was recorded for 102 of the 134 "U" lesion teeth as follows: complete caries excavation, no exposure, 65; complete excavation, direct pulp cap, 4; indirect pulp cap, 15; root canal treatment, 8; extraction, 10. Follow-up examinations for phase two treatment evaluation are to be done upon completion of recruit and service school training and at yearly intervals.

Twenty-five of the 250 teeth evaluated in the preliminary screening were extracted. Of these, 13 specimens were recovered for phase one analysis.

A cell culture laboratory has been established. Epithelial and fibroblast cell lines are currently maintained for use in dental caries toxicity testing. Carious dentin extracts from "U" lesions of teeth undergoing restorative treatment were filtered to remove microorganisms. The filtered carious extracts were evaluated for the presence of toxic components by chromium-51 release from cultured cells and intradermal injection in rabbits. A quantity of 5.0 mg filtered caries extract was required to effect a greater release of chromium-51 from cultured cells than the control of an identical weight of sound dentin extract. Release of chromium-51 from cultured cells is an evaluation technique suitable only when large caries samples are available.

The rabbit intradermal injection techniques involved an intravenous injection of Evans Blue dye followed by intradermal injections of test samples and controls. Intradermal injections of 0.002 mg caries extracts produced blue wheal reactions of 2+, on a linear scale of 5+ as the maximum, within 15 minutes. The same quantity of filtered sound dentin extract resulted in no discernible reaction up to one hour after intradermal injection. Thus, the rabbit intradermal test is a highly sensitive technique for evaluating the toxic components found in carious dentin of teeth in situ.

Work is in progress to isolate and identify the toxic fractions of carious dentin extracts with the use of the rabbit intradermal injection technique. Isolated components will be tested for their pulp toxicity in primate teeth.

CLINICAL INVESTIGATION DEPARTMENT (Cont.)

(Trauma and Surgical Problems Division)

The hypothesis that genetic typing followed by histocompatibility matching will enhance tooth allograft survival is being tested in nonhuman primates. The study includes *in vivo* and *in vitro* methods of monitoring recipient immunologic responses to dental allografts.

Thirty rhesus monkeys (*Macaca mulatta*) which were selected from a pool of 120 tissue-typed animals were donor/recipient paired on the basis of their identifiable RhL-A antigens in preparation for tooth transplantation between the animal pairs. Thirty allogeneic and thirty autologous grafts were accomplished.

Cell-mediated lymphocytotoxicity (CML) testing was done on alternate days from the 5th through the 23rd postoperative days. Paradoxically, there were three recipients anergic for CML with each one having genotypes that differed with their respective donors by two RhL-A antigens; whereas, the three "fully matched recipients" (matched for all four identifiable RhL-A antigens) had positive CML tests. The remaining "partially matched recipients" included in the study differed with their respective donors by one or two RhL-A antigens and all had positive CML's. In a paper published in FY77 on this phase of the study it was noted that CML data alone should not be used in establishing the influence of histocompatibility typing and matching on tooth transplantation.

Twenty-nine weeks postoperatively, one animal died, thereby eliminating one autograft and one allograft from the study.

Eighteen months postoperatively (FY77) 22 of 29 allografts and 28 of 29 autografts had been retained. The three "fully matched animals" retained their allogeneic tooth grafts for the 1 1/2 year test period. All 22 allografts and 10 of the remaining 28 autografts were surgically removed along with adjacent hard and soft tissues at 18 months postoperatively. Histopathological evaluations of the biopsied specimens are now being accomplished.

Mixed lymphocyte reaction (MLR) testing (in collaboration with the University of Illinois) commenced approximately one month after graft removal. Technical difficulties associated with stimulating lymphocyte transformations and general lack of reproducibility resulted in discontinuation of MLR testing.

All 29 animals in the study were then subjected to skin grafting procedures for the purpose of assaying their second set immunologic responses to donor tissue. Photographic and written records from the skin grafting phase of the study are now being independently evaluated by the project investigators.

Cryopreserved sera which were collected at pre-determined postoperative intervals will be used in assaying the humoral immune responses of the animals.

CLINICAL INVESTIGATION DEPARTMENT (Cont.)

Sixty-four dental endosseous implants were tested as functional devices over a period of 39 weeks in 8 adult monkeys (M. fascicularis). Four alloplastic materials - vitreous carbon, surgical grade Ticonium, acrylic and aluminum oxide - were compared in the study. Ten of the 64 implants were disqualified because of the death of one animal and because of the fracture upon insertion of two implant devices. Forty-four per cent of the artificial tooth roots were retained for the entire 39 week period with the respective individual material type retention percentages as follows: vitreous carbon, 84.6%; surgical grade Ticonium, 78.6%; acrylic, 14.3%; alumiun oxide, 0%. Implant mobility, gingival sulcus depth, gingival inflammation and associated infection were determined at specific intervals during the study. Upon completion of the clinical test period, biopsy specimens which included the implants and contiguous tissues were obtained. All specimens were subjected to histopathological examinations. The vitreous carbon and surgical grade Ticonium implants were found superior to the aluminum oxide and acrylic root systems in regard to all evaluation criteria.

Eight adult cynomologous monkeys have been prepared for a functional evaluation of two commercially available implant types. Insertion of the devices - 16 titanium alloy implants having a vented blade design and 16 vitreous carbon implants having an odontoid design - into selected edentulous mandibular sites of the experimental animals has been initiated. The performances of the implanted devices will be determined on the basis of clinical and histopathological findings.

(Dental Care Delivery Division)

The current survey of health status of naval recruits at Great Lakes was determined by a random sample. This population of young men, 17 to 27 years old, had an average age of 18.9 years. The majority were high school graduates from towns of under 50,000 persons. Their DMFT was 10.7 (DT=5.4, MT=0.6, FT=6.7). Current DMFS was 21.7 (DS=7.8, MS=2.9, FS=12.2). There were only 2% who were caries free (DMFT=0). Periodontal diseases were found in every subject, predominantly a localized to generalized chronic marginal gingivitis. Navy Periodontal Screening Examination Indices were NPDI=6/19 and NPI=17/85. Approximately three out of four had one NPDI pocket score of 5, and only about 2% were free of calculus.

The projected initial treatment requirements indicated 28,685 dental procedures would be required per 1,000 recruits (6,677 operative restorations, 63 prosthetic restorations or dentures, 492 carious or impacted teeth to be removed, 1,724 periodontal scaling and polishing procedures, plus examination, preventive dentistry and miscellaneous procedures).

Naval recruits selected for service school training were observed for six months by serial examinations. As a result of the plaque control program there were initial short term reductions of plaque. The net result was a statistically significant ($p = 0.01$) reduction of NPI total at the end of six months of about 3%, as scores returned toward baseline levels.

CLINICAL INVESTIGATION DEPARTMENT (Cont.)

The NPDI had a comparable reduction of 4% at six months. Evaluating on a dose-response basis showed trends of increasingly favorable response with increasing number of preventive dentistry treatments and plaque control instruction. There were trends for reduction of caries attack rate also, with increasing numbers of plaque control sessions, but the results were not statistically significant. Individual instruction was found to be an important reinforcement of group instruction for reducing plaque, calculus, and the periodontal disease index. The areas of greatest plaque accumulation were found to be the proximal surfaces of the teeth. The posterior proximal surfaces had the highest caries attack rate.

The productivity of eight young Navy dental officers was observed over a 10 month period. They used one or two dental operating rooms, one or two dental technicians (assistants) at the chair, with and without an additional rotating dental technician. The alternative modes were compared for measures of cost and measures of effectiveness. The costs of adding a second dental operating room, and also a second dental technician, were compensated for by increases in the estimated value of services rendered. More restorations and surfaces treated were accomplished when full-time dental technician assistance was assured. Total procedures and percent effectiveness increased with greater dental technician utilization. The use of the rotating dental technician was not cost-effective, but the dental officers opined that the use of a rotator improved asepsis of procedures and environment. It was projected that even greater effectiveness would occur with practical training of general dental officers and dental technicians in four-handed dentistry techniques and the utilization of a second dental chair.

SCIENTIFIC DEPARTMENT

(Biochemistry Division)

Various strains of Streptococcus mutans can synthesize sticky extracellular glucans which help the organisms to survive in the oral cavity and colonize tooth surfaces. The glucans are a mixture of water-soluble and water-insoluble polysaccharides, containing α-1,6 and α-1,3 linkages in various proportions. Degradative enzymes have been and are being tested for their effectiveness to solubilize the water-insoluble glucans, particularly those produced by Strep. mutans strains OMZ 176 and K-1R. Dextranases from Penicillium sp. and Fusarium moniliforme, which hydrolyze α-1,6 linkages, could only partially degrade the water-insoluble glucans, leaving "limit glucandextrin" residues. Analysis by carbon-13 nuclear magnetic resonance showed specimens of the limit glucandextrins to contain approximately 90 percent α-1,3 linkages. Solutions of the limit glucandextrins in potassium hydroxide for periods of several weeks showed decreases in specific rotations and base content, which was consistent with the formation of saccharinic acids that can occur during alkaline degradation of polysaccharides containing linear sequences of 1,3-linked glucosyl

SCIENTIFIC DEPARTMENT (Cont.)

units. Approximately 30 grams of the limit glucandextrins were subsequently prepared for use as substrates in screening various organisms as sources of α-1,3-glucanases. Tests are being conducted on various samples of soil and organic sludge, adding them to culture media in which the limit glucandextrins are the sole source of carbon. Organisms from the samples that may grow in the media are isolated and examined for their capacities to elaborate degradative enzymes. The limit glucandextrins are also being tested as substrates for dental plaque organisms, using plaque samples from caries-active and caries-free naval personnel.

Surface polysaccharides from two strains of Actinomyces viscosus, which may be involved in the plaque-forming ability of these organisms, have been isolated and purified by agarose gel filtration. These polymers will also be used as sole carbon sources in media for the isolation of organisms elaborating the specific glycohydrolases needed to degrade these polysaccharides.

A study has been initiated to measure the fluoride levels in the plaque of subjects with widely different caries experience. The fluoride levels, and the degree to which the fluoride is bound to the plaque, will be examined for any relationship to the caries experience. Preliminary work on the development of an electrode system to measure the small amounts of fluoride anticipated has been completed, and measurements of clinical isolates are in progress.

Methods for the quantitation of collagen synthesis in small biopsy samples have been developed for use in conjunction with the wound repair studies by the Clinical Investigation Department.

(Histopathology Division)

Currents efforts to control the incidence and severity of periodontal disease in Navy and Marine Corps personnel rely upon patient motivation for success. The objective of this work is to test the effectiveness of alternative methods of treatment for the arresting or control of chronic periodontal bone destruction. A standardized regimen was developed in FY77 to induce, with minimal acute influences, chronic destructive periodontal bone lesions in a pathogenetically defined animal model system. In FY76, Dexamethazone, a synthetic steroid with potent anti-inflammatory effects was tested and found to be ineffective in reducing either the degree of inflammation or the degree of alveolar bone loss. In FY77 dextranase, a potential enzymatic plaque reducing agent, was delivered to a group of experimental animals via their drinking water. Morphometric analysis of the dextranase group compared with an equal number of control animals revealed no significant differences in the total plaque deposits. Analysis of the alveolar bone revealed no inhibition in the degree of bone resorption in the dextranase recipients.

The antimicrobial drug, chlorhexidine gluconate, was also tested in FY77. Applied by daily swabbing in a 2% concentration this agent produced

SCIENTIFIC DEPARTMENT (Cont.)

a highly significant plaque reduction as compared to the controls. Preliminary analysis suggests that despite the reduction in total plaque, the degree of alveolar bone destruction is unaltered with the daily application of 2% chlorhexidine.

The microbial pocket flora of the animal model has been characterized to the extent that Streptococcus sanguis, Streptococcus faecalis, and Staphalococcus aureus were recovered with consistency. Pseudomonas has not been recovered.

(Microbiology Division)

A fungal dextranase was modified chemically to improve its potential application as an oral therapeutic agent. Increasing the affinity of the enzyme for human tooth surfaces would greatly prolong the anti-plaque activity of the enzyme. The prevention of dental plaque should also result in the prevention of dental caries and periodontal disease. One approach explored was to increase the binding of dextranase to tooth enamel by covalently bonding the enzyme to a carrier molecule that has a strong affinity for hydroxyapatite. Phosvitin and phosphoserine were employed in this respect since they are known to have a high affinity for hydroxyapatite. A variety of bridging reagents were also studied for the purpose of coupling the dextranase to the carrier. Thirty-four percent of the initial activity was retained following ethyl chloroformate treatment whereas 78 percent of the initial activity was retained with hexamethylene diisocyanate treatment. A high molecular weight product having dextranase activity was produced and isolated by column chromatography. Further testing and evaluation of an improved enzymatic plaque control preparation is being conducted using laboratory animals.

Streptococcus mutans is considered to be the prime etiological agent of smooth surface dental caries. An attempt is being made to eliminate or control this organism in the mouth of naval personnel with a 10 percent solution of stannous fluoride (SnF_2) placed on "super floss" and applied once to the interproximal (IP) areas of the teeth. To date eight subjects are under study and have had all their carious lesions restored (Class I condition). The IP sites still harboring S. mutans were determined. Three of the subjects have received the SnF_2 treatment, and one subject has had saline applied as a control. In the IP sites receiving the SnF_2, 60-70 percent of the previously positive S. mutans areas become negative during a one month observation period. After one month there was a gradual return of more positive sites, but not to the extent of the pretreatment levels. This study is continuing to determine if this will be a feasible approach to controlling the numbers of S. mutans in the mouth with a subsequent reduction of smooth surface decay.

There appears to be a relationship between the amount of extracellular glucans produced by S. mutans and its cariogenic potential in animals. The complete loss of extracellular glucan production by Streptococcus

SCIENTIFIC DEPARTMENT (Cont.)

mutans greatly reduces its cariogenicity in animals. Since sodium fluoride is an enzyme inhibitor, its effect on glucosyltransferase and subsequent glucan production was investigated. Three S. mutans strains were tested: high, intermediate, and low glucan producers. These organisms were grown in a chemically defined medium with 5 percent sucrose for 48 hours, with the following sodium fluoride concentrations: 0, 10, 50, and 100 PPM. The sodium fluoride at these concentrations did not significantly inhibit the production of the extracellular glucans, although there was a uniform decrease in the number of organisms with an increasing concentration of fluoride. It would appear that the glucosyltransferases are produced early in the growth of the organism, and even though the number of organisms decreases, enough enzyme is produced during the 48 hour incubation period to produce a maximum yield of extracellular glucans. Further testing with purified glucosyltransferase indicated that the fluoride did not inhibit the enzymes' ability to produce glucans. It can be concluded that sodium fluoride has an inhibitory effect on the growth of S. mutans but does not have a direct effect on its glucosyltransferase activity.

It was of interest to determine whether the S. mutans obtained from caries-free (DMFT=0) or caries-active recruits differed in their ability to produce extracellular glucans when grown in a chemically defined medium with 5 percent sucrose. Some laboratory strains of S. mutans were also tested. The results indicated that the highest glucan producers and the greatest percentage of high glucan producers occurred in the caries-active recruit when compared to the caries-free recruit. These data give further evidence of the importance of the extracellular glucans to caries activity. The laboratory strains of S. mutans tested also exhibited variation in glucan production. Four laboratory strains were tested for their ability to produce soluble and insoluble glucans; three of the strains primarily produced soluble glucans whereas the fourth primarily produced insoluble glucans.

In association with Dr. A. H. Bahn of Southern Illinois University, Alton, Illinois, and Dr. J. Hayashi of Presbyterian St. Lukes Hospital in Chicago, Illinois, immunization studies against dental caries using various enzyme preparations were tested in monkeys. The following enzymes were tested: glucosyltransferase (EC 2.4.1.5), fructosyltransferase (EC 2.4.1.10), and glycosidic hydrolases. The enzymes were injected intraorally into the monkeys. S. mutans was implanted in all monkeys and the monkeys were fed a diet containing at least 20 Gm of sucrose daily. Plaque samples for microbiological determinations, clinical and radiological examinations and blood samples were taken monthly. After 19 months the animals were sacrificed and autopsied.

There were no pathological effects resulting from immunization with enzymes. Inhibitors present in monkey sera after immunization inhibited glucosyltransferase, fructosyltransferase, and neuraminidase activities; it was presumed the inhibitors were antibodies. White and brown spots on the enamel and gross lesions were all scored as carious lesions. There

SCIENTIFIC DEPARTMENT (Cont.)

was a reduction of 68.6 percent in total carious lesions in the animals immunized intraorally with glucosyltransferase, 62.4 percent reduction in the group of monkeys injected with fructosyltransferase and 57.4 percent reduction in total lesions in those immunized with glycosidic hydrolases after 19 months, as compared to the control group. There were no gross lesions apparent in the group immunized with glycosidic hydrolases.

Although it appears that immunization with enzymes significantly reduces caries in a primate model, it remains to be seen if this approach will be feasible in humans.

A semi-selective medium for Actinomyces viscosus and Actinomyces naeslundii was previously developed at our laboratory. Attempts to improve its selectivity were carried out during the past year. The addition of cadmium chloride, sodium fluoride and cyrstal violet to the basal medium has improved the selectivity of the Actinomyces by inhibiting the growth of interfering oral microorganisms. With the development of a selective Actinomyces medium, naval personnel can be examined for location of these organisms in the mouth and relate their presence and numbers to oral diseases.

HONORS, AWARDS, POSITIONS HELD, CEREMONIES, STAFF ARRIVALS, DEPARTURES AND REENLISTMENTS

OCTOBER

LT R. J. LINDSAY was selected for augmentation in Regular Navy.

DT1 J. M. MC CORMICK was presented a Letter of Commendation.

DT2 R. A. NORTHERNER reported aboard from Taiwan.

DT2 L. SWING was presented a Letter of Appreciation.

Dr. I. L. SHKLAIR reviewed abstracts for the IADR Meeting and reviewed a paper submitted to Archives of Oral Biology.

Personnel Inspection was held on Navy Birthday.

NOVEMBER

DN J. A. ELLINGSON advanced to DT3.

Dr. L. G. SIMONSON received award for promoting dental hygiene, from North Surburban Dental Hygienists Society.

DECEMBER

LT. J. W. GALICH successfully completed North East Regional Board Dental Exams.

DT3 T. P. MOOSHEGIAN was released from active duty.

Mr. R. OSBORNE transferred to Cherry Point, North Carolina.

JANUARY

LCDR R. G. WALTER was promoted to Commander.

FEBRUARY

DN A. BROWN reported aboard from San Diego, California.

Dr. I. L. SHKLAIR received Superior Civilian Service Award; presented to him by Captain H. J. Keene, DC, USN, Naval Medical Research and Development Command, Bethesda, MD.

CAPT M. R. WIRTHLIN received CFC award plaque on behalf of the staff of the Naval Dental Research Institute.

HONORS, AWARDS, POSITIONS HELD, CEREMONIES, STAFF ARRIVALS, DEPARTURES AND REENLISTMENTS (Continued)

MARCH

LT J. W. GALICH received his license to practice dentistry in Illinois.

MAY

DT1 W. ROZMAN retired.

JUNE

CAPT D. M. ANDERSON was appointed to Scientific Advisory Panel of the Journal of Endodontics.

DTC G. R. ELLIOTT reported from Naval Regional Dental Center, Parris Island.

SSGT A. J. HORTON received a Good Conduct award and a Gleem Yard of the Month award.

HM2 J. CAMACHO received a Good Conduct award.

CDR L. F. DEVINE received a Navy Commendation Medal and was retired.

DTC G. R. ELLIOTT received a Letter of Commendation from Parris Island.

Dr. I. L. SHKLAIR was re-elected program chairman for Microbiology Division of the IADR/AADR.

Dr. L. G. SIMONSON was appointed Research Consultant to the Chicago Medical School and a member of the Research Faculty.

JULY

DN A. BROWN received a Letter of Appreciation and was transferred to NRDC, San Diego, California.

DT2 W. F. BRUTON reported aboard from Naval Regional Medical Center, Oakland, California.

HM2 D. JACKOLA received a Good Conduct award and re-enlisted for two years.

DN E. S. PEPPER reported aboard from NRDC, San Diego, California.

Dr. I. L. SHKLAIR received a 25-year Navy Civilian Service pin.

The Command was presented with Volleyball and Bowling trophies.

AUGUST

CAPT D. M. ANDERSON was appointed as Advisor to the Pulp Biology Group of the IADR.

HONORS, AWARDS, POSITIONS HELD, CEREMONIES, STAFF ARRIVALS, DEPARTURES AND REENLISTMENTS (Continued)

AUGUST (Cont.)

Mr. Maurice CHAMBERS, WG-4, Animal Caretaker, arrived.

Mr. K. KUETER, GS-8, Histopathology Technician, retired.

Mrs. D. A. PINNEO received a Certificate of Commendation for an Outstanding Performance rating.

Ms. M. J. ROUSE received a Certificate of Commendation for an Outstanding Performance rating.

Dr. I. L. SHKLAIR received a Certificate of Commendation for an Outstanding Performance rating.

SEPTEMBER

DT2 S. ORR arrived for duty from Naval Regional Medical Center, Portsmouth, Virginia.

LT. J. W. GALICH was selected for augmentation into the Regular Navy.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. / 3. RECIPIENT'S CATALOG NUMBER: Rept. for 1 Oct 76 - 30 Sep 77
4. TITLE (and Subtitle): SUMMARIES OF RESEARCH, Fiscal Year 1977	5. TYPE OF REPORT & PERIOD COVERED
	6. PERFORMING ORG. REPORT NUMBER: NDRI-PR-77-07
7. AUTHOR(s)	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Naval Dental Research Institute, Naval Base, Bldg. 1-H, Great Lakes, IL 60088	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS: Naval Medical Research & Development Command, Bethesda, MD 20014	12. REPORT DATE: OCT[illegible]77
	13. NUMBER OF PAGES: 27 (12) 31 p.
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office): Bureau of Medicine and Surgery, Department of the Navy, Washington, D. C. 20372	15. SECURITY CLASS. (of this report): UNCLASSIFIED
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

This document has been approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

108 450

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Summaries of Research

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Brief summaries of research done from 01 October 1976 through 30 September 1977, including presentations, publications and distinguished visitors.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

S/N 0102-LF-014-6601

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)